

The documentation and process conversion measures necessary to comply with this revision shall be completed by 10 January 1998.

INCH POUND

MIL-PRF-19500/115J
10 October 1997
SUPERSEDING
MIL-S-19500/115H
20 December 1993

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, VOLTAGE REGULATOR TYPES
1N3821A THROUGH 1N3828A, 1N3016B THROUGH 1N3051B,
1N3821A-1 THROUGH 1N3828A-1, 1N3016B-1 THROUGH 1N3051B-1,
1N3821AUR-1 THROUGH 1N3828AUR-1, 1N3016BUR-1 THROUGH 1N3051BUR-1,
PLUS C- AND D- TOLERANCE SUFFIX,
JAN, JANTX, JANTXV, AND JANHC

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for 1 W, silicon, voltage regulator diodes with voltage tolerances of 5 percent, 2 percent, and 1 percent. Three levels of product assurance are provided for each device type as specified in MIL-PRF-19500. One level of product assurance is provided for die.

1.2 Physical dimensions. See figures 1 (D0-13), 2 (D0-41), 3 (D0-213AB), 4, and 5 (JANHC).

1.3 Maximum ratings. Maximum ratings are as shown in columns 8 and 10 of table IV herein and as follows:

$P_T = 1.0 \text{ W}$ (D0-13 and D0-41) at $T_L = +95^\circ\text{C}$, $L = .375$ (9.53 mm); both ends of case or diode body to heat sink at $L = .375$ (9.53 mm). (Derate I_Z to 0.0 mA dc at $T_L = +175^\circ\text{C}$).

$P_T = 1.0 \text{ W}$ (D0-213AB) at $T_{EC} = +125^\circ\text{C}$. (Derate to 0 at $T_{EC} = +175^\circ\text{C}$).

$-55^\circ\text{C} \leq T_{Op} \leq +175^\circ\text{C}$; $-55^\circ\text{C} \leq T_{STG} \leq +175^\circ\text{C}$.

1.4 Primary electrical characteristics. Primary electrical characteristic columns 2, 9, 12, and 15 of table IV herein and as follows:

$3.3 \text{ V dc} \leq V_Z \leq 200 \text{ V dc}$.

A and B suffix devices are 5 percent voltage tolerance.

C suffix devices are 2 percent voltage tolerance.

D suffix devices are 1 percent voltage tolerance.

$R_{\theta JL} = 80^\circ\text{C/W}$ (maximum) at $L = .375$ inch (9.53 mm) (D0-13).

$R_{\theta JL} = 50^\circ\text{C/W}$ (maximum) at $L = .375$ inch (9.53 mm) (D0-41).

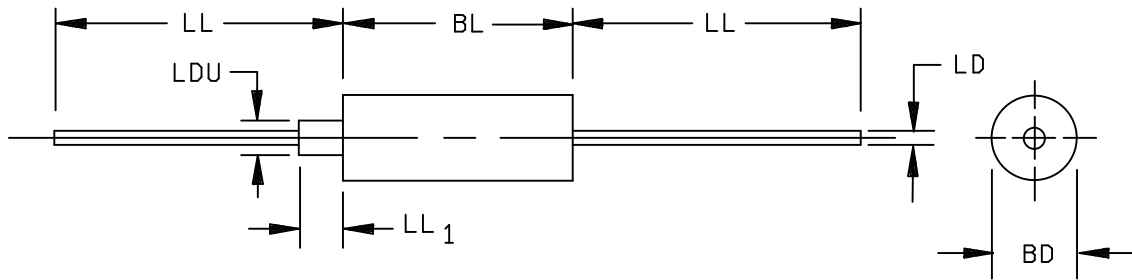
$R_{\theta JEC} = 50^\circ\text{C/W}$ (maximum) junction to endcaps (D0-213AB).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAT, 3990 East Broad St., Columbus, OH 43216-5000, by using the addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5961

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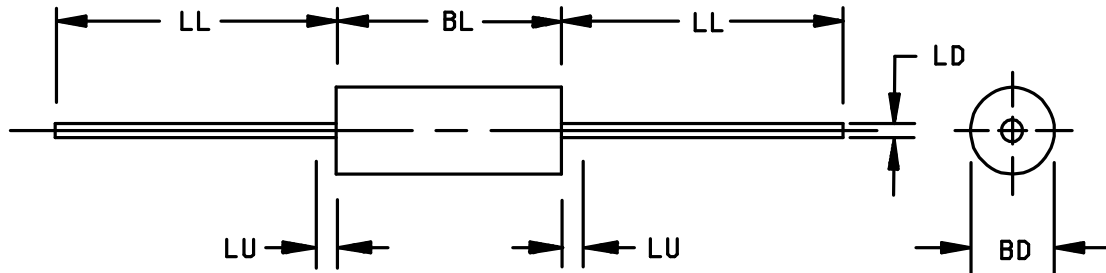


Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
LD	.026	.035	0.66	0.89	4
BD	.215	.265	5.46	6.73	
LDU	---	.110	---	2.79	
BL	.195	.350	4.96	8.89	
LL ₁	---	.21	---	5.33	
LL	1.000	---	25.40	---	

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimension BD shall be measured at the largest diameter.
4. Cathode lead shall be electrically connected to the case. If tubulation is used, it shall be on the anode end.

FIGURE 1. Semiconductor device, diode, types 1N3821A, C, D through 1N3828A, C, D and 1N3016B, C, D through 1N3051B, C, D.

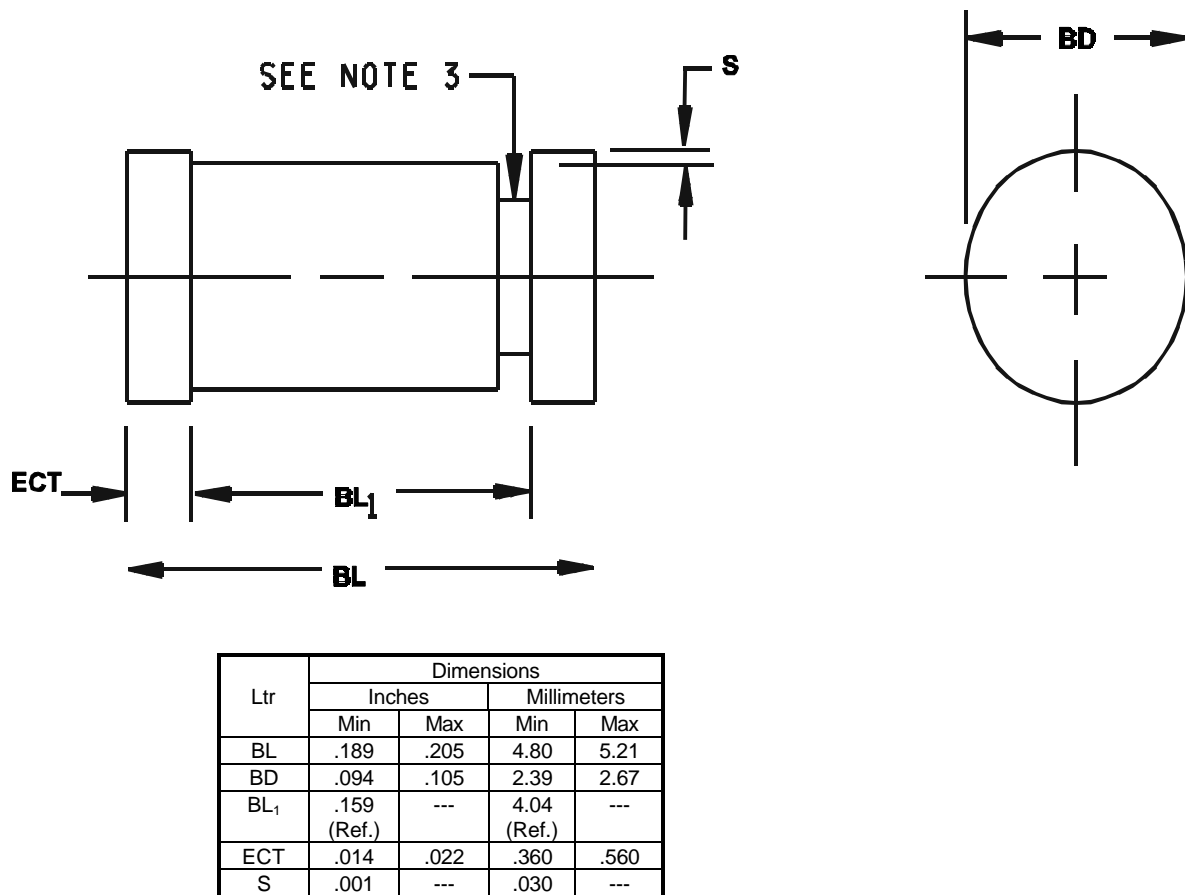


Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
LD	.028	.034	0.71	0.86	
BD	.080	.107	2.03	2.72	3
BL	.160	.205	4.06	5.21	3
LL	1.000	---	25.40	---	
LU	---	.050	---	1.27	4

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Package contour optional within BD and length BL. Heat slugs, if any, shall be included within this cylinder but shall not be subject to minimum limit of BD.
4. Within this zone lead, diameter may vary to allow for lead finishes and irregularities other than heat slugs.

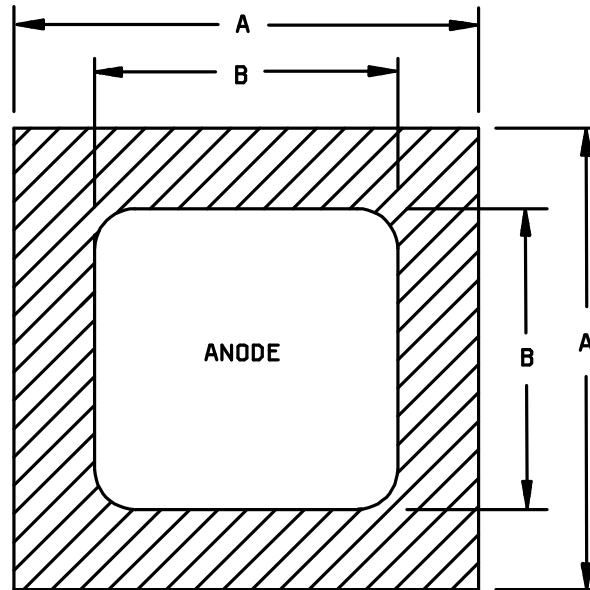
FIGURE 2. Physical dimensions, types 1N3821A-1, C-1, and D-1 through 1N3828A-1, C-1, and D-1; 1N3016B-1, C-1, and D-1 through 1N3051B-1, C-1, and D-1 (DO-41).



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Gap not controlled, shape of body and gap not controlled.

FIGURE 3. Physical dimensions of surface mount family types 1N3821AUR-1, CUR-1, and DUR-1, through 1N3828AUR-1, CUR-1, and DUR-1 and 1N3016BUR-1, CUR-1, and DUR-1 through 1N3051BUR-1, CUR-1, and DUR-1 (DO-213AB).



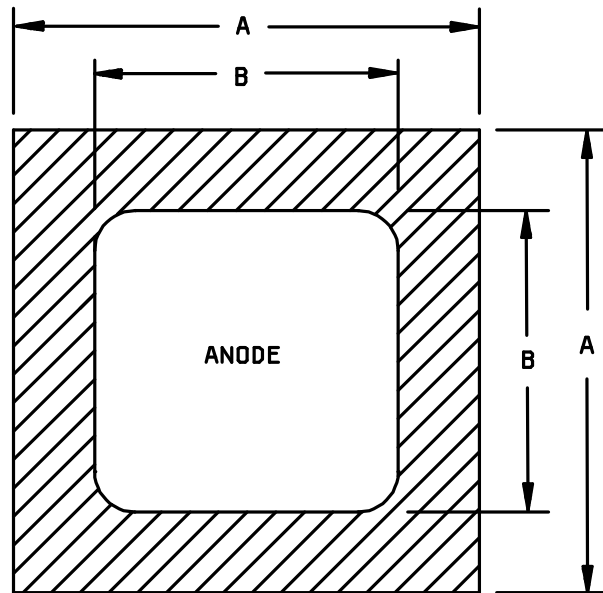
A Version

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.035	.039	.89	.99
B	.031	.033	.79	.84

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The physical characteristics of the die thickness are $.010 \pm .002$ (0.25 mm). Metallization is:
Top (anode) - Al, back (cathode) - Au. Al thickness = 25,000Å minimum, Au thickness = 4000Å minimum.

FIGURE 4. Physical dimensions JANHCA die.



B Version

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.035	.039	.89	.99
B	.027	.031	0.68	0.79

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The physical characteristics of the die thickness are $.012 \pm .002$ (0.30 mm). Metallization is:
 Top (anode) - Al, back (cathode) - Au. Al thickness = 40,000Å minimum,
 Au thickness = 5000Å minimum.

FIGURE 5. Physical dimensions JANHCB die.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

STANDARD

MILITARY

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated specifications or specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Associated specification. The individual item requirements shall be in accordance with MIL-PRF-19500, and as specified herein.

3.2 Interface requirements and physical dimensions. The Interface requirements and physical dimensions shall be as specified in MIL-PRF-19500, and figures 1 (DO-13), 2 (DO-41), 3 (D0-213AB), and figures 4 and 5 for (JANH C).

3.2.1 Lead finish. Lead finish shall be solderable in accordance with MIL-STD-750 and MIL-PRF-19500 where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

3.2.2 Dash one construction. Dash one (-1) diodes shall be of metallurgically bonded double plug construction in accordance with MIL-PRF-19500.

3.3 Marking. Marking shall be in accordance with MIL-PRF-19500.

3.3.1 Marking of UR version devices. For UR version devices only, all marking (except polarity) may be omitted from the body, but shall be retained on the initial container.

3.3.2 Polarity. For dash one or UR dash one, the polarity shall be indicated with a contrasting color band to denote the cathode end or alternately with a minimum of three contrasting color dots spaced evenly around the periphery at the cathode end.

3.4 Selection of tight tolerance devices. The C and D suffix devices shall be selected from JAN, JANTX, or JANTXV devices, which have successfully completed all applicable screening, and groups A, B, and C testing as 5 percent tolerance devices. All sublots of C and D suffix devices shall pass group A, subgroup 2, at tighter tolerances. Tighter tolerances for mounting clip temperature shall be maintained for reference purpose to establish correlation. For C and D tolerance levels, $T_L = 30 \pm 2^\circ\text{C}$ at 0.375" from body or equivalent.

3.5 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I.

3.6 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3.

4. VERIFICATION

4.1 Classification of Inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3)
- c. Conformance inspection (see 4.4).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500, and as specified herein.

4.2.1 JANHC devices. JANHC devices shall be qualified in accordance with MIL-PRF-19500.

4.2.2 Construction verification. Cross sectional photos from 3 devices shall be submitted in the qualification report.

4.3 Screening (JAN, JANTXV and JANTX levels only). Screening shall be in accordance with MIL-PRF-19500 (table IV), and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen (see table IV of MIL-PRF-19500)	<u>Measurement</u>	
	JANTX and JANTXV levels	JAN level
3a	Temperature cycling	Temperature cycling (in accordance with MIL-PRF-19500 JANTX level)
3c <u>1/</u>	Thermal impedance (see 4.5.5)	Thermal impedance (see 4.5.5)
9	Not applicable	Not applicable
11	I_{R1} and V_Z	
12	See 4.3.2, $t=48$ hours	
13 <u>2/</u>	$\Delta I_{R1} \leq 100$ percent of initial reading or 50nA dc, whichever is greater $\Delta V_Z \leq \pm 2$ percent of initial reading Subgroup 2 of table I herein	

1/ Thermal impedance may be performed any time after sealing provided temperature cycling is performed in accordance with MIL-PRF-19500, screen 3 prior to this thermal test.

2/ PDA = 5 percent for screen 13, applies to ΔI_{R1} , ΔV_Z . Thermal impedance ($Z_{\theta JX}$) is not required in screen 13.

4.3.1 Screening (JANHC). Screening of JANHC die shall be in accordance with MIL-PRF-19500.

4.3.2 Power burn-in conditions. Power burn-in conditions are as follows: I_Z = column 8 of table IV minimum; mounting and test conditions in accordance with MIL-STD-750, method 1038, test condition B, TEC = +75°C to +100°C for surface mount devices. To better utilize burn-in equipment, higher values of I_Z shall be permitted provided:

- a. The junction temperature does not exceed +175°C.
- b. The power dissipation does not exceed 1.2 W.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500, and as specified herein.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500, and table I herein. The following test conditions shall be used for Z_{0JX}, group A inspection:

- a. I_M measurement current.....1 mA - 10 mA.
- b. I_H forward heating current.....1.0 A - 2.0 A.
- c. t_H heating time.....10 ms.
- d. t_{MD} measurement delay time.....70 μ s maximum.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500, and as follows. Electrical measurements (endpoints) shall be in accordance with the applicable footnotes and steps of table III herein.

Subgroup	Method	Condition
B2	4066	See 4.5.1.
B3	1027	I _Z = I _{ZM} column 8 of table IV; T _A = +30°C \pm 5°C.
B4	----	Not applicable.
B5	----	Not applicable.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VII of MIL-PRF-19500, and as follows. Electrical measurements (endpoints) shall be in accordance with the applicable footnotes and steps of table III herein.

Subgroup	Method	Condition
C2	2036	Terminal strength: Test condition A; weight = 4 lbs; t = 15 seconds. Terminal strength: Test condition E.
C3		Applies to D0-13 devices only.
C6	1026	I _Z = I _Z column 8 of table IV; T _A = +30°C \pm 5°C.
C7	4071	I _Z = I _Z column 5 of table IV; T _A = +25°C \pm 5°C; T ₂ = +125°C \pm 5°C; α V _Z = column 15 of table IV; 22 devices, c = 0.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows:

4.5.1 Surge current (I_{ZSM}). The peak currents shown in column 10 of table IV shall be applied in the reverse direction and these shall be superimposed on the current (I_Z = I_{Z1}) (column 5 of table IV) a total of 5 surges at 1 minute intervals. Each individual surge shall be one-half square-wave-pulse of 1/120 second duration or an equivalent one-half sine wave with the same effective rms current.

4.5.2 Regulator voltage measurements. The test current shall be applied until thermal equilibrium is attained (90 seconds maximum) prior to reading the breakdown voltage. For this test, the surface mount device shall be mounted at the endcaps and the axial leaded device shall be suspended by its leads with mounting clips whose inside edge is located at 0.375 inch (9.53 mm) from the body and the mounting clips shall be maintained at a temperature of +25°C +8°C, -2°C. This measurement may be performed after a shorter time following application of the test current than that which provides thermal equilibrium if correlation to stabilized readings can be established to the satisfaction of the Government.

4.5.3 Temperature coefficient of regulator voltage (α V_Z). The device shall be temperature stabilized with current applied prior to reading regulator voltage at the specified ambient temperature as specified in 4.4.3, group C, subgroup 7.

4.5.4 Voltage regulation V_z (reg). Voltage regulation shall be determined by the difference of the regulator voltage measured at different currents as specified in table I, group A, subgroup 7. Both tests shall be performed at thermal equilibrium. This ΔV_z shall not exceed column 9 of table IV.

4.5.5 Thermal impedance $Z_{\theta JX}$ measurements for screening. The $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, method 3101. The maximum limit (not to exceed the group A, subgroup 2 limit) for $Z_{\theta JX}$ in screening (table IV of MIL-PRF-19500) shall be derived by each vendor by means of statistical methods.

4.5.5.1 For initial qualification or requalification. Read and record data ($Z_{\theta JX}$) shall be supplied to the qualifying activity on one lot (random sample of 500 devices minimum). Twenty-two serialized devices shall be sent to the qualifying activity for test correlation.

4.5.6 Thermal resistance. Thermal resistance measurement shall be in accordance with MIL-STD-750, method 3101 or 4081. Forced moving air or draft shall not be permitted across the device during test. The maximum limit for $R_{\theta JL}$ under these test conditions shall be $R_{\theta JL}$ (max) = 80°C/W (D0-13), $R_{\theta JL}$ (max) = 50°C/W (D0-41), or $R_{\theta JEC}$ = 50°C/W. The following conditions shall apply when using method 3101:

- a. I_M 1 mA to 10 mA.
- b. I_H 0.5 A to 1.0 A.
- c. t_H 25 seconds minimum.
- d. t_{MD} 70 μ s maximum.

LS = Lead spacing = 3/8 inch as defined on figure 6 below:
LS = 0 inches for "UR" suffix devices.

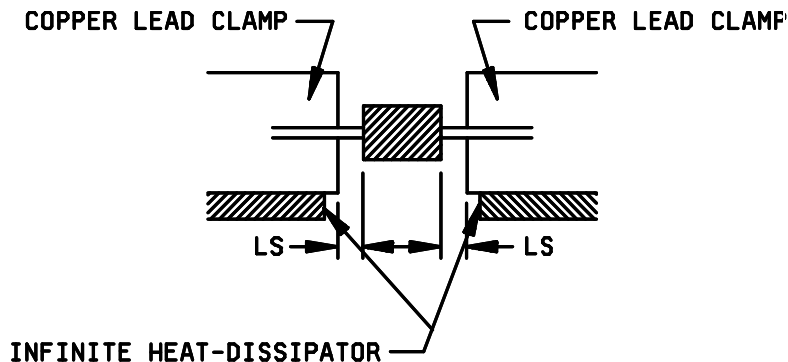


FIGURE 6. Mounting conditions.

4.5.6.1 For initial qualifications and requalifications. Read and record data in accordance with group E herein and shall be included in the qualification report.

TABLE I. Group A inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Units <u>2/</u>		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u> Visual and mechanical examination	2071					
<u>Subgroup 2</u> Forward voltage	4011	$I_F = 200 \text{ mA dc}$	V_F		1.2	V dc
Reverse current	4016	DC method; $V_R =$ column 11 of table IV	I_{R1}		Column 12	$\mu\text{A dc}$
Regulator voltage (see 4.5.2)	4022	$I_{Z1} = I_Z =$ (column 5 of table IV)	V_Z	Column 3	Column 4	V dc
Thermal impedance	3101	See 4.5.5 (-1 devices only)	$Z_{\theta JX}$		15	$^{\circ}\text{C/W}$
<u>Subgroup 3</u> High-temperature operation		$T_A = +150^{\circ}\text{C}$				
Reverse current (-1 devices only)	4016	DC method: $V_R =$ column 11 of table IV	I_{R2}		Column 14	$\mu\text{A dc}$
<u>Subgroup 4</u> Small-signal reverse breakdown impedance	4051	$I_Z =$ column 5 of table IV; $I_{\text{sig}} = 10 \text{ percent of } I_Z$	Z_Z		Column 6	ohms
Small-signal knee impedance	4051	$I_{ZK} =$ column 16 of table IV; $I_{\text{sig}} = 10 \text{ percent of } I_{ZK}$	Z_{ZK}		Column 7	ohms
<u>Subgroups 5. and 6</u> Not applicable						
<u>Subgroup 7</u> Voltage regulation (see 4.5.4)		$I_Z = 10 \text{ percent of column 8 of table IV (current 1)}$ $I_Z = 50 \text{ percent of column 8 of table IV (current 2)}$	$V_Z (\text{reg})$		Column 9	V dc

1/ For sampling plan, see MIL-PRF-195002/ Column references are to table IV herein.

TABLE II. Group E inspection (all product assurance levels).

Inspection 1/	MIL-STD-750		Qualification conformance Inspection (LTPD)
	Method	Conditions	
<u>Subgroup 1</u> Temperature cycling Electrical measurements	1051	500 cycles See table III, Steps 1, 2, 3, and 5	45 devices, c = 0
<u>Subgroup 2</u> Intermittent life Electrical measurements	1037	6,000 cycles See table III, steps 1, 2, and 3	45 devices, c = 0
<u>Subgroup 3</u> Not applicable			
<u>Subgroup 4</u> Thermal resistance surface mount	3101 or 4081	R θ JEC = 50°C/W (maximum) at zero lead length. +25°C ≤ TR ≤ +35°C, (see 4.5.6)	22 devices, c=0
Thermal resistance leaded	3101 or 4081	R θ JL = 80°C/W (maximum) at 0.375 lead length. +25°C ≤ TR ≤ +35°C, (see 4.5.6)	22 devices, c=0

1/ A separate sample may be pulled for each test.

TABLE III. Group A, B, C, and E electrical end-point measurements. 1/ 2/ 3/

Step	Inspection	MIL-STD-750		Symbol	Limits 1/		Unit
		Method	Conditions		Min	Max	
1.	Reverse current	4016	DC method, V _R = column 11 of table IV	I _{R1}		Column 12	μA dc
2	Reverse current	4016	DC method, V _R = column 11 of table IV	I _{R3}		Column 13	μA dc
3.	Breakdown voltage (see 4.5.2)	4022	I _Z = column 5 of table IV	V _Z	Column 3	Column 4	V dc
4.	Small-signal breakdown impedance	4051	I _Z = column 5 I _{sig} = 10 percent of I _Z	Z _Z		Column 6	ohms
5.	Thermal impedance	3101	See 4.5.5	Z _{θJX}		15	°C/W

1/ Column references are to table IV herein.

2/ The electrical measurements for table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500 are as follows:

- a. Subgroup 2, see table III herein, steps 1, 3, 4, and 5.
- b. Subgroups 3 and 6, see table III herein, steps 2, 3, and 4.

3/ The electrical measurements for table VII of MIL-PRF-19500 are as follows:

- a. Subgroup 2, see table III herein, steps 1, 3, 4, and 5.
- b. Subgroup 3, (D0-13 devices only), see table III herein, steps 1, 3, and 4.
- c. Subgroup 6, see table III herein, steps 2, 3, and 4.

TABLE IV. Test ratings for diodes, types 1N3821A through 1N3828A and 1N3016B through 1N3051B (5 percent tolerance).

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12		Col 13	Col 14	Col 15	Col 16
Voltage Group 1/ Z	VZ Norm	VZ Min	VZ Max	IZ Test current	ZZ Impedance	ZZK Knee impedance	IZM Max dc current	Vz (reg)	IR (Surge) T _A = +25°C	VR Reverse voltage	IR1 Reverse current dc		IR3 Reverse current dc	(-1 only) IR2 Reverse current dc; T _A = +150°C	αVZ Temperature coefficient	Izk Test current
	2/ Z	2/ Z	2/ Z	mA	ohms	ohms	mA	Volts	mA	Volts	non -1 μA	-1 μA	non-1 μA	μA	%/°C	mA
1N3821A	3.3	3.14	3.46	76	10	400	276	1.00	1380	1	100	100	200	150	-0.075	1.0
1N3822A	3.6	3.42	3.78	69	10	400	252	0.80	1260	1	100	75	200	100	-0.070	1.0
1N3823A	3.9	3.71	4.09	64	9	400	238	0.75	1190	1	50	25	100	40	-0.060	1.0
1N3824A	4.3	4.09	4.51	58	9	400	213	0.70	1070	1	10	5	20	10	-0.050	1.0
1N3825A	4.7	4.47	4.93	53	8	500	194	0.60	970	1	10	5	20	10	±.025	1.0
1N3826A	5.1	4.85	5.35	49	7	550	178	0.50	890	1	10	3	20	6	±.030	1.0
1N3827A	5.6	5.32	5.88	45	5	600	162	0.40	810	2	10	3	20	6	+0.040	1.0
1N3828A	6.2	5.89	6.51	41	2	700	146	0.30	730	3	10	3	20	6	+0.050	1.0
1N3016B	6.8	6.46	7.14	37	3.5	700	140	0.30	740	5.2	150	5.0	300	10	+0.057	1.0
1N3017B	7.5	7.13	7.87	34	4.0	700	125	0.35	680	5.7	100	5.0	200	10	+0.061	0.5
1N3018B	8.2	7.79	8.61	31	4.5	700	115	0.40	600	6.2	50	5.0	100	10	+0.065	0.5
1N3019B	9.1	8.65	9.55	28	6.0	700	105	0.45	540	6.9	25	5.0	50	10	+0.068	0.5
1N3020B	10	9.5	10.5	25	7	700	95	0.50	480	7.6	25	5.0	50	10	+0.071	0.25
1N3021B	11	10.45	11.55	23	8	700	85	0.55	420	8.4	10	1.0	20	4	+0.073	0.25
1N3022B	12	11.40	12.60	21	9	700	80	0.60	400	9.1	10	1.0	20	4	+0.076	0.25
1N3023B	13	12.35	13.65	19	10	700	74	0.65	370	9.9	10	0.5	20	2	+0.079	0.25
1N3024B	15	14.25	15.75	17	14	700	63	0.75	320	11.4	10	0.5	20	2	+0.082	0.25
1N3025B	16	15.20	16.80	15.5	16	700	60	0.80	300	12.2	10	0.5	20	2	+0.083	0.25
1N3026B	18	17.10	18.90	14.0	20	750	52	0.83	260	13.7	10	0.5	20	2	+0.085	0.25
1N3027B	20	19.0	21.0	12.5	22	750	47	0.95	240	15.2	10	0.5	20	2	+0.086	0.25
1N3028B	22	20.9	23.1	11.5	23	750	43	1.0	210	16.7	10	0.5	20	2	+0.087	0.25
1N3029B	24	22.8	25.2	10.5	25	750	40	1.1	200	18.2	10	0.5	20	2	+0.088	0.25
1N3030B	27	25.7	28.3	9.5	35	750	34	1.3	170	20.6	10	0.5	20	2	+0.090	0.25
1N3031B	30	28.5	31.5	8.5	40	1000	31	1.4	160	22.8	10	0.5	20	2	+0.092	0.25
1N3032B	33	31.4	34.6	7.5	45	1000	28	1.5	150	25.1	10	0.5	20	2	+0.091	0.25
1N3033B	36	34.2	37.8	7.0	50	1000	26	1.7	130	27.4	10	0.5	20	2	+0.093	0.25
1N3034B	39	37.1	40.9	6.5	60	1000	23	1.8	110	29.7	10	0.5	20	2	+0.094	0.25
1N3035B	43	40.9	45.1	6.0	70	1500	21	1.9	100	32.7	10	0.5	20	2	+0.095	0.25
1N3036B	47	44.7	49.3	5.5	80	1500	19	2.1	95	35.8	10	0.5	20	2	+0.095	0.25
1N3037B	51	48.5	53.5	5.0	95	1500	18	2.3	90	38.8	10	0.5	20	2	+0.096	0.25
1N3038B	56	53.2	58.8	4.5	110	2000	17	2.5	85	32.6	10	0.5	20	2	+0.096	0.25

See footnotes at end of table

TABLE IV. Test ratings for diodes, types 1N3821A through 1N3828A and 1N3016B through 1N3051B (5 percent tolerance).- Continued

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12	Col 13	Col 14	Col 15	Col 16
Voltage Group	VZ Nom	VZ Min	VZ Max	IZ Test current	ZZ impedance	ZZK Knee impedance	I _{ZM} Max dc current	V _Z (reg)	IR (Surge) T _A = +25°C	VR Reverse voltage	IR1 Reverse current dc*	IR3 Reverse current dc	(-1 only) IR2 Reverse current dc; T _A = +150°C	αVZ Temperature coefficient*	IZK Test current*
1/ 2/	Volts	Volts	Volts	mA	ohms	ohms	mA	Volts	mA	Volts	non -1 μA	non -1 μA	μA	%/°C	mA
1N3039B	62	58.95	65.1	4.0	125	2000	15	2.7	75	47.1	10	20	10	+0.097	0.25
1N3040B	68	64.60	71.4	3.7	150	2000	14	3.0	70	51.7	10	20	10	+0.097	0.25
1N3041B	75	71.35	78.7	3.3	175	2000	12	3.3	63	56.0	10	20	10	+0.098	0.25
1N3042B	82	77.95	86.1	3.0	200	3000	11	3.6	58	62.2	10	20	10	+0.098	0.25
1N3043B	100	95.0	105	2.5	350	3000	10	4.0	55	60.0	10	20	10	+0.099	0.25
1N3045B	110	104.5	115.5	2.3	450	4000	8.3	5.0	42	83.6	10	20	10	+0.100	0.25
1N3046B	120	114	126	2.0	550	4500	8.0	5.5	40	91.2	10	20	10	+0.100	0.25
1N3047B	130	123.5	136.5	1.9	700	5000	6.9	6.0	35	98.8	10	20	10	+0.100	0.25
1N3048B	150	142.5	157.5	1.7	1000	6000	5.7	7.0	29	114.0	10	20	10	+0.100	0.25
1N3049B	160	152	168	1.6	1100	6500	5.4	8.0	27	121.6	10	20	10	+0.100	0.25
1N3050B	180	171	189	1.4	1200	7000	4.9	10.0	25	136.8	10	20	10	+0.100	0.25
1N3051B	200	190	210	1.2	1500	8000	4.6	12.0	23	152.0	10	20	10	+0.100	0.25

1/ Ratings also apply to dash one and surface mount devices unless otherwise noted.

2/ 5 percent voltage tolerances are shown in table.

For 2 percent tolerance ("C" suffix; for "-1" suffix and JANHC only), column 3 is 2 percent less than column 2, column 4 is 2 percent more than column 2.

For 1 percent tolerance ("D" suffix; for "-1" suffix and JANHC only), column 3 is 1 percent less than column 2, column 4 is 1 percent more than column 2.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Points' packaging activity within the Military Department or Defense Agency, or within the Military Departments' System Command. Packaging data retrieval is available from the managing Military Departments' or Defense Agencies' automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

5.2 Marking. Unless otherwise specified (see 6.2), marking shall be in accordance with MIL-STD-129.

NOTES:

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Notes. The notes specified in MIL-PRF-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Issue of DODISS to be cited in the solicitation.
- b. Lead finish (see 3.3.1).
- c. For die acquisition, the JANHC letter version should be specified (see figures 4 and 5).
- d. Product assurance level and type designation.

6.3 Substitution information. Device types 1N3821A through 1N3828A and 1N3016B through 1N3051B (excluding JANHC devices) are inactive for new design as of the date of this specification. The corresponding dash-one suffix device should be used for new design.

6.3.1 Substitutability of 2 percent and 1 percent tolerance devices. Devices of tighter tolerance are a direct one way substitute for the looser tolerance devices (example: JANTX1N3821D-1 substitutes for JANTX1N3821A-1).

6.4 Suppliers of JANHC die. The qualified JANHC suppliers with the applicable letter version (example JANHCA1N3821A) will be identified on the QPL.

JANHC ordering information		
PIN	Manufacturer CAGE	
	55801	12954
1N3821A through 1N3828A	JANHCA1N3821A through JANHCA1N3828A	JANHCB1N3821A through JANHCB1N3828A
1N3016B through 1N3051B	JANHCA1N3016B through JANHCA1N3051B	JANHCB1N3016B through JANHCB1N3051B

NOTE: C and D tolerance suffix are applicable to JANHC.

6.5 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL-19500 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center Columbus, DSCC-VQE, Columbus, OH 43216.

6.6 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:

Army - CR
Navy - EC
Air Force - 17
NASA - NA

Preparing activity:
DLA - CC

(Project 5961-1677)

Review activities:

Army - AR, AV, MI, SM
Navy - AS, CG, MC
Air Force - 13, 19, 85, 99

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-PRF-19500/115J

2. DOCUMENT DATE (YYMMDD)
97/10/10

3. DOCUMENT TITLE

SEMICONDUCTOR DEVICE, DIODE, SILICON, VOLTAGE REGULATOR TYPES 1N3821A THROUGH 1N3828A, 1N3016B THROUGH 1N3051B, 1N3821A-1 THROUGH 1N3828A-1, 1N3016B-1 THROUGH 1N3051B-1, 1N3821AUR-1 THROUGH 1N3828AUR-1, 1N3016BUR-1 THROUGH 1N3051BUR-1, PLUS C- AND D- TOLERANCE SUFFIX, JAN, JANTSX, JANTXV, AND JANHC

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)

(1) Commercial

(2) AUTOVON
(If applicable)7. DATE SUBMITTED
(YYMMDD)

8. PREPARING ACTIVITY

a. NAME

Al Barone

b. TELEPHONE (Include Area Code)

(1) Commercial (2) AUTOVON
614-692-0510 850-0510

c. ADDRESS (Include Zip Code)

Defense Supply Center Columbus
ATTN: DSCC-VAT
Columbus, OH 43232

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Defense Quality and Standardization Office
5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466
Telephone (703) 756-2340 AUTOVON 289-2340